

Stream Depletion from Well

(Jenkins, 1977; Walton, 1984)

Project: Big Sur Rv @ El Sur
 Well: New Well
 Date: 5/16/11
 Investigator: DFG-KHC

- 3,653 = Hydraulic conductivity aquifer, ft/day
- 27,328 = Hydraulic conductivity of aquifer, gpd/ft²
- 25 = Thickness of aquifer, ft
- 683,202 = Transmissivity of aquifer, gpd/ft
- 0.25 = Storativity
- 500 = Distance from well to line of effective recharge (stream), ft
- 1,064 = Constant pump rate, gpm
- 2.37 = Constant pump rate, ft³/sec
- 0.684 = Stream depletion factor, sdf, days

Pumping time, hrs	Pumping time, days	Stream Depletion Rate, cfs	Stream Depletion Rate, gpm	Depletion as % of Pumping Rate	Total Volume Pumped ac.ft	Stream Depleted Volume, cu.ft	Stream Depleted Volume, ac-ft.	Depletion as % of Total Pumped Volume
1	0.04	0.010	4.43	0.4	0.2	6	0.000	0.1
2	0.08	0.101	45.46	4.3	0.4	182	0.004	1.1
3	0.13	0.232	104.29	9.8	0.6	780	0.018	3.0
4	0.17	0.360	161.62	15.2	0.8	1,850	0.042	5.4
6	0.25	0.574	257.52	24.2	1.2	5,246	0.120	10.2
8	0.33	0.737	330.87	31.1	1.6	9,991	0.229	14.6
12	0.50	0.967	434.20	40.8	2.4	22,385	0.514	21.9
24	1.00	1.324	594.32	55.9	4.7	72,991	1.676	35.6
48	2.00	1.610	722.61	67.9	9.4	201,694	4.630	49.2
24	1.00	1.324	594.32	55.9	4.7	72,991	1.676	35.6
48	2.00	1.610	722.61	67.9	9.4	201,694	4.630	49.2
72	3.00	1.744	782.64	73.6	14.1	347,131	7.969	56.5
96	4.00	1.825	819.19	77.0	18.8	501,552	11.514	61.2
120	5.00	1.881	844.42	79.4	23.5	661,807	15.193	64.6
144	6.00	1.923	863.17	81.1	28.2	826,244	18.968	67.2
192	8.00	1.982	889.67	83.6	37.6	1,164,026	26.722	71.0
240	10.00	2.023	907.85	85.3	47.0	1,510,242	34.670	73.7
480	20.00	2.124	953.27	89.6	94.0	3,309,016	75.965	80.8
720	30.00	2.169	973.50	91.5	141.1	5,165,501	118.584	84.1
960	40.00	2.196	985.59	92.6	188.1	7,051,969	161.891	86.1
1,200	50.00	2.214	993.85	93.4	235.1	8,957,628	205.639	87.5
1,440	60.00	2.228	999.95	94.0	282.1	10,876,931	249.700	88.5
1,920	80.00	2.247	1,008.52	94.8	376.2	14,744,421	338.485	90.0
2,160	90.00	2.254	1,011.69	95.1	423.2	16,688,962	383.126	90.5
2,232	93.00	2.256	1,012.54	95.2	437.3	17,273,460	396.544	90.7
2,400	100.00	2.260	1,014.37	95.3	470.2	18,639,112	427.895	91.0

Stream Depletion from Well

(Jenkins, 1977; Walton, 1984)

Project: Big Sur Rv @ El Sur
 Well: Old Well
 Date: 5/16/11
 Investigator: DFG-KHC

- 3,653 = Hydraulic conductivity aquifer, ft/day
- 27,328 = Hydraulic conductivity of aquifer, gpd/ft²
- 25 = Thickness of aquifer, ft
- 683,202 = Transmissivity of aquifer, gpd/ft
- 0.25 = Storativity
- 1050 = Distance from well to line of effective recharge (stream), ft
- 1,189 = Constant pump rate, gpm
- 2.65 = Constant pump rate, ft³/sec
- 3.018 = Stream depletion factor, sdf, days

Pumping time, hrs	Pumping time, days	Stream Depletion Rate, cfs	Stream Depletion Rate, gpm	Depletion as % of Pumping Rate	Total Volume Pumped ac.ft	Stream Depleted Volume, cu.ft	Stream Depleted Volume, ac-ft.	Depletion as % of Total Pumped Volume
1	0.04	0.000	0.00	0.0	0.2	0	0.000	0.0
2	0.08	0.000	0.02	0.0	0.4	0	0.000	0.0
3	0.13	0.001	0.61	0.1	0.7	2	0.000	0.0
4	0.17	0.007	3.12	0.3	0.9	15	0.000	0.0
6	0.25	0.037	16.66	1.4	1.3	158	0.004	0.3
8	0.33	0.088	39.67	3.3	1.8	601	0.014	0.8
12	0.50	0.218	97.90	8.2	2.6	2,786	0.064	2.4
24	1.00	0.581	260.73	21.9	5.3	20,439	0.469	8.9
48	2.00	1.020	457.82	38.5	10.5	91,697	2.105	20.0
24	1.00	0.581	260.73	21.9	5.3	20,439	0.469	8.9
48	2.00	1.020	457.82	38.5	10.5	91,697	2.105	20.0
72	3.00	1.267	568.56	47.8	15.8	191,342	4.393	27.9
96	4.00	1.428	640.96	53.9	21.0	308,186	7.075	33.7
120	5.00	1.544	692.89	58.3	26.3	436,817	10.028	38.2
144	6.00	1.632	732.44	61.6	31.5	574,163	13.181	41.8
240	10.00	1.848	829.53	69.8	52.5	1,179,966	27.088	51.6
480	20.00	2.076	931.65	78.4	105.1	2,891,374	66.377	63.2
600	25.00	2.135	958.25	80.6	131.4	3,801,587	87.272	66.4
720	30.00	2.179	978.00	82.3	157.6	4,733,832	108.674	68.9
960	40.00	2.241	1,005.89	84.6	210.2	6,645,229	152.553	72.6
1,200	50.00	2.284	1,025.01	86.2	262.7	8,600,991	197.452	75.2
1,440	60.00	2.315	1,039.18	87.4	315.3	10,588,396	243.076	77.1
1,920	80.00	2.360	1,059.11	89.1	420.4	14,630,352	335.867	79.9
2,160	90.00	2.376	1,066.50	89.7	472.9	16,676,468	382.839	81.0
2,232	93.00	2.381	1,068.48	89.9	488.7	17,292,950	396.991	81.2
2,400	100.00	2.390	1,072.75	90.2	525.4	18,735,662	430.112	81.9

Stream Depletion from Well

(Hunt, 1999)

Project: Big Sur River@ El Sur Ranch
 Well: New Well
 Date: 5/16/11
 Investigator: DFG

- 3,653 = Hydraulic conductivity aquifer, ft/day
- 27,328 = Hydraulic conductivity of aquifer, gpd/ft²
- 25 = Thickness of aquifer, ft
- 104 = Hydraulic conductivity of stream bed, ft/day
- 778.0 = Hydraulic conductivity of stream bed, gpd/ft²
- 1 = Thickness of stream bed, ft
- 25 = Width of stream bed, ft
- 2600.0 = Lamda** - stream leakance, ft/day
- 683,202 = Transmissivity of aquifer, gpd/ft
- 0.25 = Aquifer storage coefficient
- 500 = Distance from well to line of effective recharge (stream), ft
- 1,064 = Constant pump rate, gpm
- 2.37 = Constant pump rate, ft³/sec
- 0.684 = Stream depletion factor, sdf, days
- 14.23 = Stream bed factor, sbf, dimensionless

Pumping time, hrs	Pumping time, days	Stream Depletion Rate, cfs	Stream Depletion Rate, gpm	Depletion as % of Total Pumping Rate	Total Volume Pumped ac.ft	*Stream Depletion Volume, cu.ft.	*Stream Depletion Volume, ac.ft.	Stream Depletion as a % of Total Pumped Volume
6	0.25	0.519	233.07	21.9	1.2	5,608	0.129	10.95
12	0.50	0.967	434.20	40.8	2.4	21,664	0.497	21.15
18	0.75	1.184	531.34	49.9	3.5	44,898	1.031	29.23
24	1.00	1.324	594.32	55.9	4.7	71,984	1.653	35.15
36	1.50	1.500	673.43	63.3	7.1	132,995	3.053	43.29
48	2.00	1.610	722.61	67.9	9.4	200,179	4.595	48.87
60	2.50	1.686	756.94	71.1	11.8	271,382	6.230	53.00
72	3.00	1.744	782.64	73.6	14.1	345,475	7.931	56.22
96	4.00	1.825	819.19	77.0	18.8	499,652	11.470	60.99
120	5.00	1.881	844.42	79.4	23.5	659,775	15.146	64.42
144	6.00	1.923	863.17	81.1	28.2	824,131	18.919	67.06
192	8.00	1.982	889.67	83.6	37.6	1,161,553	26.666	70.89
480	20.00	2.124	953.27	89.6	94.0	3,290,153	75.532	80.32
600	25.00	2.150	964.90	90.7	117.6	4,213,278	96.724	82.28
720	30.00	2.169	973.50	91.5	141.1	5,146,140	118.139	83.75
960	40.00	2.196	985.59	92.6	188.1	7,031,775	161.427	85.83
1,200	50.00	2.214	993.85	93.4	235.1	8,936,991	205.165	87.27
1,440	60.00	2.228	999.95	94.0	282.1	10,856,028	249.220	88.34
1,920	80.00	2.247	1,008.52	94.8	376.2	14,722,336	337.978	89.85
2,160	90.00	2.254	1,011.69	95.1	423.2	16,666,787	382.617	90.41

* integrated using trapizoidal rule

** Lamda can be calculated as $K' \cdot W / b'$; W = width of stream, K' = k of stream bed, and b' = thickness of stream bed, from ISBN 1-86937-387-1, Pattle Delamore Partners, June 2000; after Butler and Tsou, Kansas Geo. Survey OFR 2000-8

Stream Depletion from Well

(Hunt, 1999)

Project: Big Sur River@ El Sur Ranch
 Well: Old Well
 Date: 5/16/11
 Investigator: DFG

- 3,653 = Hydraulic conductivity aquifer, ft/day
- 27,328 = Hydraulic conductivity of aquifer, gpd/ft²
- 25 = Thickness of aquifer, ft
- 104 = Hydraulic conductivity of stream bed, ft/day
- 778.0 = Hydraulic conductivity of stream bed, gpd/ft²
- 1 = Thickness of stream bed, ft
- 25 = Width of stream bed, ft
- 2600.0 = Lamda** - stream leakance, ft/day
- 683,202 = Transmissivity of aquifer, gpd/ft
- 0.25 = Aquifer storage coefficient
- 1,050 = Distance from well to line of effective recharge (stream), ft
- 1,189 = Constant pump rate, gpm
- 2.65 = Constant pump rate, ft³/sec
- 3.018 = Stream depletion factor, sdf, days
- 29.89 = Stream bed factor, sbf, dimensionless

Pumping time, hrs	Pumping time, days	Stream Depletion Rate, cfs	Stream Depletion Rate, gpm	Depletion as % of Total Pumping	Total Volume Pumped ac.ft.	*Stream Depletion Volume, cu.ft.	*Stream Depletion Volume, ac.ft.	Stream Depletion as a % of Total Pumped Volume
6	0.25	0.037	16.66	1.4	1.3	401	0.009	0.70
12	0.50	0.218	97.90	8.2	2.6	3,158	0.072	2.76
18	0.75	0.413	185.55	15.6	3.9	9,978	0.229	5.81
24	1.00	0.581	260.73	21.9	5.3	20,717	0.476	9.05
36	1.50	0.837	375.56	31.6	7.9	51,339	1.179	14.95
48	2.00	1.020	457.82	38.5	10.5	91,445	2.099	19.98
60	2.50	1.158	519.83	43.7	13.1	138,495	3.179	24.20
72	3.00	1.267	568.56	47.8	15.8	190,874	4.382	27.80
96	4.00	1.428	640.96	53.9	21.0	307,290	7.054	33.56
120	5.00	1.544	692.89	58.3	26.3	435,673	10.002	38.07
144	6.00	1.632	732.44	61.6	31.5	572,862	13.151	41.71
240	10.00	1.848	829.53	69.8	52.5	1,174,226	26.957	51.30
480	20.00	2.076	931.65	78.4	105.1	2,869,370	65.872	62.68
600	25.00	2.135	958.25	80.6	131.4	3,778,886	86.751	66.04
720	30.00	2.179	978.00	82.3	157.6	4,710,706	108.143	68.60
960	40.00	2.241	1,005.89	84.6	210.2	6,620,203	151.979	72.31
1,200	50.00	2.284	1,025.01	86.2	262.7	8,574,952	196.854	74.93
1,440	60.00	2.315	1,039.18	87.4	315.3	10,561,741	242.464	76.91
1,920	80.00	2.360	1,059.11	89.1	420.4	14,600,961	335.192	79.74
2,160	90.00	2.376	1,066.50	89.7	472.9	16,646,870	382.160	80.81

* integrated using trapizoidal rule

** Lamda can be calculated as $K' \cdot W / b'$; W = width of stream, K' = k of stream bed, and b' = thickness of stream bed, from ISBN 1-86937-387-1, Pattle Delamore Partners, June 2000; after Butler and Tsou, Kansas Geo. Survey OFR 2000-8

Residual Stream Depletion from Well

(Hunt, 1999)

Project: Big Sur River@ El Sur Ranch
 Well: New Well
 Date: 5/16/11
 Investigator: DFG

- 3,653 = Hydraulic conductivity aquifer, ft/day
- 27328.1 = Hydraulic conductivity of aquifer, gpd/ft²
- 25 = Thickness of aquifer, ft
- 683,202 = Transmissivity of aquifer, gpd/ft
- 0.25 = Aquifer storage coefficient
- 500 = Distance from well to line of effective recharge (stream), ft
- 1064 = Constant pump rate, gpm
- 2.37 = Constant pump rate, ft³/sec
- 120.0 = Total Pumping time, hrs
- 5.0 = Total Pumping time, days
- 23.5 = Total Volume pumped, ac.ft.
- 0.684 = Stream depletion factor, sdf, days
- 15.193 = Total Volume depleted during pumping, ac.ft

Time Since Pumping Stopped, hrs	Time Since Pumping Stopped, days	Total Time Since Pumping Started, hrs	Total Time Since Pumping Started, days	Stream Depletion Rate, cfs	Stream Depletion Rate, gpm	Depletion as % of Total Pumping Rate	Volume Depleted Since Pump Started, ac.ft	Volume Depleted Since Pump Stopped, ac.ft
3	0.13	123.0	5.13	1.655	742.76	69.8	15.64	0.45
4	0.17	124.0	5.17	1.529	686.29	64.5	15.77	0.58
8	0.33	128.0	5.33	1.159	520.37	48.9	16.21	1.02
12	0.50	132.0	5.50	0.936	420.22	39.5	16.56	1.36
16	0.67	136.0	5.67	0.787	353.42	33.2	16.84	1.65
24	1.00	144.0	6.00	0.599	268.85	25.3	17.29	2.10
36	1.50	156.0	6.50	0.440	197.48	18.6	17.80	2.61
48	2.00	168.0	7.00	0.346	155.21	14.6	18.19	2.99
60	2.50	180.0	7.50	0.283	127.10	11.9	18.50	3.30
72	3.00	192.0	8.00	0.238	107.02	10.1	18.75	3.56
96	4.00	216.0	9.00	0.1789	80.32	7.5	19.16	3.97
120	5.00	240.0	10.00	0.1413	63.43	6.0	19.48	4.28
144	6.00	264.0	11.00	0.1156	51.87	4.9	19.73	4.54
192	8.00	312.0	13.00	0.0829	37.20	3.5	20.12	4.93
240	10.00	360.0	15.00	0.0633	28.41	2.7	20.41	5.21
720	30.00	840.0	35.00	0.0149	6.69	0.6	21.59	6.39

* assumes that last part of equation 20 goes to zero after 3 hours of pumping

Residual Stream Depletion from Well

(Hunt, 1999)

Project: Big Sur River@ El Sur Ranch
 Well: Old Well
 Date: 5/16/11
 Investigator: DFG

- 3,653 = Hydraulic conductivity aquifer, ft/day
- 27328.1 = Hydraulic conductivity of aquifer, gpd/ft²
- 25 = Thickness of aquifer, ft
- 683,202 = Transmissivity of aquifer, gpd/ft
- 0.25 = Aquifer storage coefficient
- 1050 = Distance from well to line of effective recharge (stream), ft
- 1189 = Constant pump rate, gpm
- 2.65 = Constant pump rate, ft³/sec
- 120.0 = Total Pumping time, hrs
- 5.0 = Total Pumping time, days
- 26.3 = Total Volume pumped, ac.ft.
- 3.018 = Stream depletion factor, sdf, days
- 10.028 = Total Volume depleted during pumping, ac.ft

Time Since Pumping Stopped, hrs	Time Since Pumping Stopped, days	Total Time Since Pumping Started, hrs	Total Time Since Pumping Started, days	Stream Depletion Rate, cfs	Stream Depletion Rate, gpm	Depletion as % of Total Pumping Rate	Volume Depleted Since Pump Started, ac.ft	Volume Depleted Since Pump Stopped, ac.ft
3	0.13	123.0	5.13	1.555	697.79	58.7	10.41	0.38
4	0.17	124.0	5.17	1.553	697.08	58.6	10.54	0.51
8	0.33	128.0	5.33	1.487	667.52	56.1	11.05	1.02
12	0.50	132.0	5.50	1.372	615.99	51.8	11.52	1.49
16	0.67	136.0	5.67	1.254	562.84	47.3	11.95	1.92
24	1.00	144.0	6.00	1.051	471.71	39.7	12.71	2.68
36	1.50	156.0	6.50	0.832	373.43	31.4	13.64	3.61
48	2.00	168.0	7.00	0.682	306.03	25.7	14.38	4.36
60	2.50	180.0	7.50	0.574	257.48	21.7	15.00	4.98
72	3.00	192.0	8.00	0.492	221.01	18.6	15.53	5.50
96	4.00	216.0	9.00	0.3791	170.17	14.3	16.39	6.36
120	5.00	240.0	10.00	0.3044	136.64	11.5	17.06	7.03
144	6.00	264.0	11.00	0.2519	113.05	9.5	17.61	7.58
192	8.00	312.0	13.00	0.1835	82.36	6.9	18.46	8.43
240	10.00	360.0	15.00	0.1416	63.53	5.3	19.10	9.07
720	30.00	840.0	35.00	0.0344	15.42	1.3	21.79	11.76

* assumes that last part of equation 20 goes to zero after 3 hours of pumping

Stream Depletion from Well

(Hunt, 1999)

Project: Big Sur River@ El Sur Ranch
 Well: Old Well
 Date: 5/16/11
 Investigator: DFG

- 3,653 = Hydraulic conductivity aquifer, ft/day
- 27,328 = Hydraulic conductivity of aquifer, gpd/ft²
- 25 = Thickness of aquifer, ft
- 104 = Hydraulic conductivity of stream bed, ft/day
- 778.0 = Hydraulic conductivity of stream bed, gpd/ft²
- 15 = Thickness of stream bed, ft
- 25 = Width of stream bed, ft
- 173.3 = Lamda** - stream leakance, ft/day
- 683,202 = Transmissivity of aquifer, gpd/ft
- 0.25 = Aquifer storage coefficient
- 1,050 = Distance from well to line of effective recharge (stream), ft
- 1,189 = Constant pump rate, gpm
- 2.65 = Constant pump rate, ft³/sec
- 3.018 = Stream depletion factor, sdf, days
- 1.99 = Stream bed factor, sbf, dimensionless

Pumping time, hrs	Pumping time, days	Stream Depletion Rate, cfs	Stream Depletion Rate, gpm	Depletion as % of Total Pumping Rate	Total Volume Pumped ac.ft	*Stream Depletion Volume, cu.ft.	*Stream Depletion Volume, ac.ft.	Stream Depletion as a % of Total Pumped Volume
6	0.25	0.025	11.12	0.9	1.3	267	0.006	0.47
12	0.50	0.152	68.04	5.7	2.6	2,172	0.050	1.90
18	0.75	0.296	132.76	11.2	3.9	7,004	0.161	4.08
24	1.00	0.425	190.81	16.0	5.3	14,790	0.340	6.46
36	1.50	0.633	284.19	23.9	7.9	37,649	0.864	10.97
48	2.00	0.791	354.95	29.9	10.5	68,407	1.570	14.94
60	2.50	0.915	410.67	34.5	13.1	105,253	2.416	18.39
72	3.00	1.016	456.03	38.4	15.8	146,963	3.374	21.40
96	4.00	1.172	526.21	44.3	21.0	241,504	5.544	26.38
120	5.00	1.290	578.77	48.7	26.3	347,858	7.986	30.40
144	6.00	1.382	620.15	52.2	31.5	463,254	10.635	33.73
240	10.00	1.620	727.04	61.1	52.5	981,922	22.542	42.90
480	20.00	1.890	848.20	71.3	105.1	2,498,092	57.348	54.57
600	25.00	1.963	881.27	74.1	131.4	3,330,401	76.455	58.20
720	30.00	2.019	906.22	76.2	157.6	4,190,631	96.204	61.03
960	40.00	2.099	942.00	79.2	210.2	5,969,550	137.042	65.20
1,200	50.00	2.154	966.90	81.3	262.7	7,806,875	179.221	68.22
1,440	60.00	2.196	985.52	82.9	315.3	9,686,082	222.362	70.53
1,920	80.00	2.255	1,011.95	85.1	420.4	13,531,220	310.634	73.90
2,160	90.00	2.276	1,021.64	85.9	472.9	15,488,561	355.568	75.19

* Integrated using trapizoidal rule

** Lamda can be calculated as $K'W/b'$; W = width of stream, K' = k of stream bed, and b' = thickness of stream bed, from ISBN 1-86937-387-1, Pattle Delamore Partners, June 2000; after Butler and Tsou, Kansas Geo. Survey OFR 2000-8

Exhibit DFG-C-58h

Stream Depletion from Well

(Hunt, 1999)

Project: Big Sur River@ El Sur Ranch
 Well: Old Well
 Date: 5/16/11
 Investigator: DFG

- 3,653 = Hydraulic conductivity aquifer, ft/day
- 27,328 = Hydraulic conductivity of aquifer, gpd/ft²
- 25 = Thickness of aquifer, ft
- 1 = Hydraulic conductivity of stream bed, ft/day
- 7.5 = Hydraulic conductivity of stream bed, gpd/ft²
- 1 = Thickness of stream bed, ft
- 25 = Width of stream bed, ft
- 25.0 = Lamda** - stream leakance, ft/day
- 683,202 = Transmissivity of aquifer, gpd/ft
- 0.25 = Aquifer storage coefficient
- 1,050 = Distance from well to line of effective recharge (stream), ft
- 1,189 = Constant pump rate, gpm
- 2.65 = Constant pump rate, ft³/sec
- 3.018 = Stream depletion factor, sdf, days
- 0.29 = Stream bed factor, sbf, dimensionless

Pumping time, hrs	Pumping time, days	Stream Depletion Rate, cfs	Stream Depletion Rate, gpm	Depletion as % of Total Pumping Rate	Total Volume Pumped ac.ft	*Stream Depletion Volume, cu.ft.	Stream Depletion Volume, ac.ft.	Stream Depletion as a % of Total Pumped Volume
6	0.25	0.023	10.49	0.9	1.3	252	0.006	0.44
12	0.50	0.138	62.15	5.2	2.6	2,000	0.046	1.75
18	0.75	0.264	118.58	10.0	3.9	6,349	0.146	3.70
24	1.00	0.373	167.60	14.1	5.3	13,236	0.304	5.78
36	1.50	0.543	243.79	20.5	7.9	33,034	0.758	9.62
48	2.00	0.668	299.65	25.2	10.5	59,187	1.359	12.93
60	2.50	0.763	342.66	28.8	13.1	90,098	2.068	15.75
72	3.00	0.840	377.16	31.7	15.8	124,740	2.864	18.17
96	4.00	0.958	429.88	36.2	21.0	202,418	4.647	22.11
120	5.00	1.045	469.08	39.5	26.3	288,943	6.633	25.25
144	6.00	1.114	499.93	42.0	31.5	382,210	8.774	27.83
192	8.00	1.218	546.46	46.0	42.0	583,640	13.399	31.87
480	20.00	1.513	679.15	57.1	105.1	1,999,227	45.896	43.67
600	25.00	1.579	708.49	59.6	131.4	2,667,033	61.227	46.61
720	30.00	1.630	731.75	61.5	157.6	3,360,153	77.138	48.94
960	40.00	1.709	767.26	64.5	210.2	4,802,954	110.261	52.46
1,200	50.00	1.769	793.84	66.8	262.7	6,305,516	144.755	55.10
1,440	60.00	1.816	814.97	68.5	315.3	7,854,002	180.303	57.19
1,920	80.00	1.888	847.22	71.3	420.4	11,053,726	253.759	60.37
2,160	90.00	1.916	860.04	72.3	472.9	12,696,963	291.482	61.64

* integrated using trapizoidal rule

** Lamda can be calculated as $K \cdot W / b$; W = width of stream, K = k of stream bed, and b = thickness of stream bed, from ISBN 1-86937-387-1, Pattle Delamore Partners, June 2000; after Butler and Tsou, Kansas Geo. Survey OFR 2000-8